3. *First,* I understand that some commenters have claimed that AT&T has a "closed" or "proprietary" broadband Internet strategy. Nothing could be further from the truth. As everyone in the industry is aware, AT&T has always followed – and has publicly committed to continue to follow – an open strategy that allows its customers complete freedom to access the content of their choice. Thus, all subscribers to the AT&T@Home service can reach the public Internet in just "one click." The merger with MediaOne will have no impact on this commitment.

4. Subscribers to the AT&T@Home service also can, quite simply, bypass the AT&T@Home "home page" altogether and instead select a different portal or browser as the "start-up" page. In addition, a subscriber can use the "always on" feature of the service to bypass AT&T@Home content simply by remaining positioned in the content of a different online service provider.

5. In contrast, I am aware of no similarly simple means available to customers of industry leader AOL to tailor their online experience. Rather, AOL's service appears designed to make it very difficult for customers to leave AOL's content.

6. It is also incorrect that AT&T@Home customers are forced to purchase content they do not want. All of our customers have chosen us over one of the many, many narrowband and broadband alternatives available to them – in virtually every case we have had to convince the customer to go to the trouble of switching from AOL or another established online services provider. And our customer research shows

that although a significant percentage of AT&T@Home subscribers elect to use the home page tailoring features of the AT&T@Home service at one time or another,[1] most customers purchase the service because they value the experience delivered by the AT&T@Home home page and linked content.

7. It is misleading to claim that our customers are being forced to pay for content. Rather, revenues generated from the sale of advertising, if anything, *subsidize* the costs of providing access. We did not invent this business model. Indeed, it has been the most common model in the new Internet economy. Everyone from AOL to "portals" such as Yahoo underwrites distribution and content development costs by, among other things, building "e-commerce" pages and by charging other businesses for posting advertising and links to other web sites.

8. Moreover, AT&T is open to negotiate any arrangement with any content provider that will generate value for its subscribers and makes commercial sense. Indeed, as a new entrant with little market share – and one that has made massive investments in upgrading cable systems to allow them to carry two-way, high speed data service – AT&T is pursuing any and all opportunities to make its AT&T@Home service more attractive to consumers. In this incredibly dynamic industry, to set one specific approach in stone is to invite commercial death.

[1] Indeed, approximately 40 percent of customers surveyed indicated that they have, at one time or another, used their browser's features to bypass the AT&T@Home home page.

9. *Second*, I understand that some economists in this proceeding claim that dial-up online services do not compete with AT&T@Home and other broadband online services. Our real-world experience is just the opposite. We know that the overwhelming majority of our customers come from existing dial-up Internet services. We further know that these customers are very price sensitive. In addition, while cable modem service offers benefits such as high access speeds and the "always on" feature, it also has disadvantages relative to dial up access. Cable modem access is only available at the subscriber's home, whereas dial-up access subscribers can log on remotely anywhere there is a telephone line. Likewise, those dial-up subscribers that buy a second line can also use that line to send faxes or other telephone calls. Because we know that most customers weigh these advantages and disadvantages, and because we must convince most customers to switch from an existing dial-up service, our pricing is driven in large part by the competitive forces of dial-up pricing (which, of course, generally includes second line costs).

10. Thus, while there may be a few customers that want broadband enough to pay more, we cannot build a business on that small subset of customers -- there certainly are not enough to justify a price increase that would decrease our competitiveness with dial-up Internet services.

11. *Lastly*, there is no truth to claims that AT&T will impede Internet competition by imposing "proprietary" protocols. AT&T has no plans to insist that

content providers or applications developers write to proprietary standards in any way that would prevent content or applications from working on other networks.

12. Quite frankly, content providers and application developers would find it laughable if I attempted what GTE and others hypothesize. Compared to other players, we have a small minority of Internet customers, and applications developers that agreed to the GTE approach would thus be shutting themselves out of most of the market. The reality is that the Internet has a history of open, compatible standards that are constantly reviewed and updated by standard-setting bodies such as the Internet Engineering Task Force, and virtually everyone in the industry works with this framework. That will not change -- it has been my experience that Internet market forces reward open standards and drive out proprietary standards.

13. AT&T has also been an industry leader in promoting the depoyment of open platform DOCSIS modems that allow customers to purchase their own modems from a variety of manufacturers.

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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of:	)	
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Applications for Consent to the	)	
Transfer of Control of Licenses	)	
	)	
MediaOne Group, Inc.,	)	
Transferor,	)	CS Docket No. 99-251
	)	
To	)	
	)	
AT&T Corp.	)	
Transferee.	)	

DECLARATION OF KENNETH A. SHULMAN

1. My name is Kenneth A. Shulman. I am Local Network Technology Vice President of AT&T Corp. I am responsible for the architecture, technology, standards and evolution plans for AT&T's local networks, including all aspects of access technologies.

2. Prior to the Teleport Communications Group (TCG) merger into AT&T, I was Senior Vice President/Chief Technology Officer at TCG. I had been with TCG since 1987, and held prior positions as Vice President, Applied Research & Development; Vice President, Technology and Network Planning; Director, Engineering and Technology, and Director, Technology and Services. Prior to joining TCG, I have held positions as Director of Systems Engineering at MCI International; District Manager of Integrated Network Evolution Planning at Bell Communications Research, and as MTS-Supervisor in Systems Engineering at Bell Laboratories.

3. In these capacities, I have been involved in all aspects of telecommunications, with focus on switching systems engineering, remote switching architectures, switching applications planning, data network planning, development and implementation of store and forward message switching systems and planning and implementation of wireless and fiber optics-based broadband communications networks. In total, I have twenty-three years of experience in telecommunications systems engineering and applications for voice, data and video. I hold B.S. and M.S. degrees in Electrical Engineering from SUNY at Stony Brook and the University of Rochester, respectively, and an M.B.A. from the Wharton School. I am a member of IEEE, and the International Engineering Consortium Executive Council. I am also a member of the FCC's North American Numbering Council.

4. I have prepared this Declaration in response to the Declaration of Dale E. Veeneman and Evertt H. Williams ("Veeneman/Williams Declaration"), which is attached as Appendix C to the Petition of GTE Service Corporation, GTE Internetworking, and GTE Media Ventures, Inc. (collectively "GTE") to Deny Application, or in the Alternative, to condition the Merger on Open Access Requirements, which was filed August 23, 1999, in the above-captioned proceeding.

5. I have reviewed the Veeneman/Williams Declaration. In my opinion, the Veeneman/Williams Declaration overstates GTE's inability to provide xDSL service to a "substantial percentage" of potential broadband Internet access customers. While the Veeneman/Williams Declaration recounts the distance, digital loop carrier (DLC), bridge tap, and load coil issues that GTE must address in order to deploy ubiquitously its DSL services, Veeneman and Williams fail to address current technological advancements that are designed to minimize many, if not all, of these

"limitations" to DSL services deployment. Continuing technological solutions applied to DSL services, along with the incumbent LECs' willingness to make the necessary investment to upgrade their networks, will expand the ILECs already substantial ability to offer DSL services to achieve nearly ubiquitous coverage.

6. In addition to these technological advancements, Veeneman and Williams neglect to mention the impact that the introduction of G.lite, an International Telecom Union- (ITU) approved standard that will allow "plug-and-play" ADSL modems, will have upon the availability and deployment simplicity of DSL services, and they simply ignore other arguable advantages that DSL service enjoys by virtue of its scalability and its reliance on a dedicated line architecture that passes over 98 percent of all United States households. As a result of these developments, I believe that there are no technological impediments that prevent DSL services from being deployed on a scale comparable to, or even more widespread than, cable modem services. Accordingly, I believe that analysts' predictions that 90 to 95 percent of American homes will be DSL-capable within the next five years reflect the most realistic representation that DSL services will be widely available to consumers.

GTE underestimates the percentage of homes qualified to receive DSL service

7. Veeneman and Williams estimate that only 65 percent of GTE customers qualify for DSL service because their premises are within 18,000 feet of a GTE central office. As an initial matter, I question the accuracy and implication of their estimate for several reasons. First, the Veeneman/Williams estimate contradicts statements publicly attributed to GTE's director of DSL programs for GTE Networks, Jeff Bolton, who, in a July 23, 1999 St. Petersburg Times news

article, claimed that 75 percent of homes in GTE's service area are within 18,000 feet of a GTE central office.

8. Second, even if the 65 percent DSL-qualification estimate is accurate for GTE, the Veeneman/Williams estimate is considerably below generally accepted analyst estimates, including Salomon Smith Barney, that approximately 75 percent of all telephone lines in the United States are within 18,000 feet of an incumbent LEC's central office. Indeed, other incumbent LECs appear to be able to offer DSL services to a significantly higher percentage of their customers. For example, AT&T estimates that 75 percent of all households in SBC-affiliated service areas are qualified to receive DSL service. In other BOC regions, such as Bell Atlantic, as much as 89 percent of all households may be qualified to receive DSL service.

9. At most, the Commission should view the 65 percent DSL-availability threshold cited in the Veeneman/Williams Declaration as only a current, not future, indicator of DSL availability and indicative, if at all, only of GTE's network. Moreover, the relative ease of DSL deployment is demonstrated by the fact that, in several GTE markets, GTE has already deployed, or will soon deploy, DSL services to 65 percent of all available households within a service area that has DSL-capability. For example, in the Tampa, Florida metropolitan area, local news reports indicate that GTE intends to offer DSL services to 65 percent of all Tampa Bay households by the end of this year. Similarly, an August Fort Worth Star-Telegram article indicated that GTE expects to reach 65 percent of all its customers with DSL service by the end of 2000. Finally, it has been reported that Covad and GTE have been engaged in serious negotiations which, if executed, could quickly expand the availability of DSL throughout GTE's service areas.

10. There are other reasons why I believe that the Commission should discount Veeneman and Williams statements regarding DSL service availability. Their 65 percent threshold for DSL availability does not take into consideration the rapid pace at which technology advancements are being made to enhance widespread DSL deployment. As discussed below, recent developments in DLC systems, repeaters that can boost the digital signal strength, and better and smaller DSL Access Multiplexers (DSLAMs), all have significantly increased the percentage of homes reachable by DSL technologies. In the July, 1999 issue of Telephony, GTE's manager of product development for GTE Service Corp., Bev White, indicated that GTE is currently working with vendors to develop DSLAMs that can be installed in a DLC to expand availability to customers served by DLC.

11. In addition, the Veeneman/Williams Declaration fails to address the impact that the introduction of an ADSL standard supported by the computer industry known as G.lite will have upon the deployment of ADSL services. G.lite, an ITU-approved standard that will allow "plug-and-play" ADSL modems with a downstream speed of approximately 1.5 Mbps, is seen as a technological improvement that will not only reduce the incumbent LECs' cost of deploying ADSL service significantly -- because it eliminates truck roll costs --, it will also likely increase the number of homes capable of receiving ADSL services. The introduction of G.lite will cut the cost of the incumbent LECs' installation process roughly in half by some estimates. Dell, Compaq, and other PC manufacturers are currently selling DSL-compatible PCs using G.lite DSL.

12. The Veeneman/Williams Declaration also ignores certain advantages that xDSL service can claim over cable modem services by virtue of its scalability and its reliance on a dedicated line architecture. For example, while cable operators must upgrade entire neighborhoods at a time to provide cable modem services to any single customer, DSL service is deployable on a line-by-line basis throughout an ILEC wire center, with the simple installation of a central office located DSLAM.

13. Finally, an important point of distinction between cable modems and DSL, is that with cable modems, the bandwidth available on the cable is shared among all users served by that cable segment. With DSL, bandwidth to the user is dedicated between the end user and the ILEC central office. While the issues are debatable -- and we clearly do not subscribe to the notion -- some customers might perceive DSL as providing better service, or prefer DSL services for fear that the shared cable spectrum might compromise the privacy or security of their communications services. Indeed, GTE's website, at www.gte.com/DSL/comp.html, promotes DSL as the "superior technology" and touts DSL's ability to keep "sensitive information secure" based on these arguments (which they clearly believe). Similarly, some customers may believe that DSL bandwidth may offer an advantage over shared cable spectrum, which conceivably could become congested during periods of peak use.

GTE's contention that its ADSL service is "restricted to" homes located within 18,000 feet of a central office and in neighborhoods not served by DLCs today is simply wrong.

14. GTE's contention that loop length and the existence of DLCs "significantly impair" DSL deployment is incorrect for several reasons. First, new technology is bringing DSL to areas farther away from the central office, and at higher data rates. While basic ADSL service was once available only within 18,000 feet (3 miles) of a central office that has been equipped with a DSLAM, that situation has changed. Equipment manufacturers have developed DSL access products which can carry DSL services to residences with loops that are as much as 120,000 feet (20 miles) from the incumbent LEC's central office even without the use of a remote terminal.

15. Equipment manufacturers have recently developed a series of loop extension solutions that were specifically designed to overcome the distance limitation cited by GTE. For example, in August, 1999, GoDigital, together with Copper Mountain – a DSL equipment vendor – developed and released a product line that would extend data and voice-over-IDSL services to almost 100,000 feet (over 17 miles) from the central office or remote terminal. Earlier this year, GlobeSpan Semiconductor Inc. introduced new chip sets that are able to transmit DSL services at distances of up to 30,000 feet from the central office. Elastic Networks sells high-speed copper access solutions based on EtherLoop technology, which provides multi-megabit DSL access over regular copper phone lines up to 21,000 feet. These developments are hardly speculative. Jim Southworth, Chief Technologist for Concentric Network Corporation, recently indicated that DSL technology advancements could soon make DSL service available to 95 percent of all United States households.

16. Second, while GTE claims that the most significant challenge to expand ADSL deployment is providing service to customers whose loops are provisioned through DLCs, equipment manufacturers have recognized the business opportunities that have resulted from widespread interest in DSL technologies. As a result, these manufactures have developed, and are developing, numerous ways to bring DSL to neighborhoods served by DLCs today. Industry-wide DLC solutions are available in two general categories, one involving new fiber-based DLC deployments, where the DSL capability is built right into the line cards that terminate the loops in the DLC, and the other consisting of mini-DSLAMs that can be fit into existing DLC remote terminals in the field.

17. Alcatel, for one, has developed a variety of fully scalable xDSL platforms, including line cards for the Alcatel Litespan DLC, and mini-DSLAM packages designed for low-density subscriber DLC situations. Several other manufacturers also market ADSL cards with DSLAM functionality that are now made to go into the remote terminals.

18. New generation DLCs effectively shorten the loop-length to the home by integrating the DLC/DSLAM functions at the incumbent LECs' remote terminals. While GTE contends that it does not have room to place DSLAM functionality within a remote terminal, these new generation DLCs take up significantly less space than older DLCs. For example, Lucent has developed a new generation DLC, called the AnyMedia Access System, that contains DSLAM functionality and is 50 percent smaller than traditional DLCs. The AnyMedia Access System is a "plug and play" platform that incorporates AnyMedia FAST, a 23-inch hardware shelf that

contains the application packs -- ADSL, ISDN, POTS and other line cards -- and software to deliver voice and data services. Because of its small size, an AnyMedia FAST shelf can integrate full-rate or G.lite ADSL in a remote terminal, mounted on a utility pole, or housed in a weather-resistant cabinet in a residential neighborhood. Nortel has also developed a similar new generation DLC, called the "UE9000," which contains both DLC and DSLAM functionality that can be housed in a remote terminal, taking up roughly one-third to one-sixth of the space needed to accommodate older DLCs. Moreover, Lucent AnyMedia, the Nortel UE 9000, and other new generation DLCs have solved the "backplane" problem raised by Veeneman/Williams, because they have the backplane capacity sufficient to carry the bandwidth needed to deploy ADSL services.

19. There is no technical reason why incumbent LECs cannot increase the availability of xDSL services by collocating DSLAMs at the DLC sites, or by upgrading existing DLCs to incorporate DSLAM functionality. Either can be done. GTE's claim that it does not have sufficient remote terminal space to deploy either solution is disingenuous, since the space requirements for modern DLCs and current/next generation DSLAMs are significantly smaller than last generation technology.

20. Telecommunications providers pick-and-choose their DSL deployment areas and can add customers incrementally through scalable DSLAMs and line cards. By contrast, cable operators, because of the shared nature of the cable network, typically must upgrade entire neighborhoods to provide cable modem services. Thus, cable operators have essentially redesigned their cable plant

and made the necessary upgrades so that they could provide a bundle of video, telecommunications, and cable modem services.

21. Given the potential revenue streams available from GTE's promise to deliver DSL service to Microsoft Corp.'s Microsoft Network and America Online, Inc. subscribers, as well as additional revenues available from provisioning bundled voice, data, and video services from a single network using multiple xDSL technologies, I find GTE's claims that it is currently unprofitable for GTE to offer xDSL service to customers whose loops are provisioned through DLCs questionable, at best.

The existence of bridged taps and load coils on local telephone lines does not significantly impact the deployment of DSL services to customers.

22. GTE claims that the presence of bridged taps and loading coals can disrupt the provision of ADSL service to GTE's customers. As GTE correctly claims, this problem can be solved by conditioning the loop to remove bridged taps and loading coals. Removing bridged taps and loading coils, however, is not as significant a technical or economic impediment as GTE would suggest.

23. Telephony magazine reports that GTE has developed a database, based on outside plant records and other information, that "will provide a strong indication of whether a line will support DSL." (Telephony, July 5, 1999) GTE has used its own Digital Services Testing System (DSTS), which combines this database with tests of the line to determine qualification, and claims a 99 percent accuracy rate for the DSTS. (Network World, June 28, 1999)

24. Recent technological developments also make it easier for customers and carriers to identify qualified lines. For example, In June, 1999, Telcordia introduced a new service called Sapphyre Loop Qualification Service, which determines within 5 minutes whether a phone line can handle the digital access technology and the maximum DSL speed the line can handle. Telcordia says its reading of the lines is 99% accurate.

25. ILEC loop conditioning costs should not inhibit DSL deployments. Such loop conditioning costs are a one-time expense and are typically less expensive than processes and procedures that cable operators must undertake to ensure that cable modem services can be deployed over their upgraded networks. In fact, ILECs are recouping these conditioning costs, and profits, through nonrecurring charges to their retail customers and to CLECs obtaining unbundled DSL capable loops far in excess of the forward looking costs of such conditioning. Pacific Bell, for example, currently imposes a $900 per-line non-recurring loop conditioning fee on customers that could include functions such as the removal of load coils, bridge taps, and/or repeaters. Similarly, as reported by CLECs, incumbent LECs are charging CLECs obtaining such loops as much as $2,000 in nonrecurring charges. See, e.g., Comments of Covad Communications Co., filed May 26, 1999, CC Docket No. 96-98, at 33.

Conclusion

26. Although GTE and other incumbent LECs attempt to deflect attention from their DSL services by pointing out "technological" limitations on these services, the truth is that the only real limitation on DSL technology is the unwillingness of the incumbent LECs to make the necessary

investments. Technological advancements have already been developed that minimize many, if not all, of the short-term technical limitations to DSL deployment raised by Veeneman and Williams. Continuing technological solutions applied to DSL services, along with ILEC investment in deploying fiber in the loop, DLCs will expand considerably the availability of DSL services on a nationwide basis. As a result of these developments, I believe that analysts' predictions that 90 to 95 percent of American homes will be DSL-capable within the next five years reflect the most realistic representation that DSL services will be widely available to consumers.

I declare under the penalty of perjury that the foregoing is true and correct.

Kenneth A. Shulman
Local Network Technology
Vice President
AT&T Corporation
(973) 236-6900

Dated: September 17, 1999

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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of:	)	
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Applications for Consent to the	)	
Transfer of Control of Licenses	)	
	)	
MediaOne Group, Inc.,	)	
Transferor,	)	CS Docket No. 99-251
	)	
To	)	
	)	
AT&T Corp.,	)	
Transferee.	)	

DECLARATION OF MILO MEDIN

1. My name is Milo Medin. I am Senior Vice President and Chief Technical Officer (CTO) of Excite@Home Network. As both Senior Vice President and CTO, I oversee the development of Excite@Home Network's high-speed backbone. Prior to joining Excite@Home Network, I served as project manager at NASA Ames Research Center. During my tenure, I directed the NASA National Research and Education Network project that, in combination with partners at Lawrence Livermore National Lab, deployed a high speed national ATM infrastructure connecting major supercomputing and data archiving centers. I also supervised the primary west coast Internet interconnect network. In addition, I pioneered the global NASA Science Internet project, providing network infrastructure for science at more than 200 sites in 16 countries and 5 continents, including Antarctica, and initially helped establish the TCP/IP protocol as an industry standard.

2. I have prepared this Declaration in response to the technical issues raised in the Declaration of Albert Parisian ("Parisian Declaration"), which is attached as Appendix D to the Petition of GTE Service Corporation, GTE Internetworking, and GTE Media Ventures, Inc. (collectively "GTE") to Deny Application, or in the Alternative, to condition the Merger on Open Access Requirements, and the Declaration of Ali Shadman ("Shadman Declaration"), which is attached as Exhibit 5 to the Comments of Ameritech, Inc. ("Ameritech"), both of which were filed August 23, 1999, in the above-captioned proceeding.

3. I have reviewed both the Parisian and the Shadman Declarations. Both declarations imply that AT&T and MediaOne can make simple technical modifications to their existing cable system architecture in order to accommodate multiple Internet service providers ("ISPs") through a forced access solution. In fact, the Parisian and Shadman Declarations fail to consider costly and time consuming re-architecting of the existing cable system architecture that would be required to implement such a solution.

GTE's Proposal Illustrates That Cable System Architecture Simply Does Not Lend Itself Easily to Forced Access for Cable Modem Services

4. As an initial matter, the views expressed by Ameritech and GTE reflect only the results of limited "friendly" trials among two or three affiliated and favored ISPs (AOL and its wholly-owned subsidiary CompuServe, which have entered into business alliances with Ameritech, GTE, SBC, and Bell Atlantic). Such limited trials cannot present the full range of real world demands that multiple access would impose on broadband networks, and they provide no insights into whether such a model is scalable.

5. Shadman simply asserts, without support, that "there is no reason . . . why technology could not be adapted or developed to permit a choice of ISPs." Shadman Decl. at ¶ 27. Only Parisian has attempted to formulate a forced access proposal. As detailed below, however, Parisian's proposal could cause customer interference, network integration, and network congestion problems, and prevent multicasting. Parisian also apparently misunderstands the cable broadband architecture in a number of fundamental respects.

6. In his declaration, Parisian suggests that GTE is able to implement its forced access solution by "simply" adding a single "off-the-shelf" device to its network, the ISP Subscriber Manager, in front of an existing regional router. GTE's proposal also relies on "tunneling," which utilizes networking solutions, either PPP Over Ethernet (PPPoE) or L2TP, neither of which are full Internet Engineering Task Force (IETF) standards. The PPPoE approach can only operate using layer 2 bridging (as opposed to a layer 3 based switching process called routing). Very few of the existing DOCSIS deployed systems support this layer 2 bridging function, primarily due to operational difficulties experienced with this approach in prior proprietary architecture cable modem systems. For example, the two primary vendors of DOCSIS CMTS equipment in @Home's systems are Cisco systems and 3com, neither of which's products support this capability, nor do they recommend that approach to operating a cable data network.

7. L2TP can operate through a layer 3 based CMTS, but this requires additional configuration information in the client and greatly complicates the ability for the cable operator to manage Quality of Service (QoS) capabilities in the network. This is because the tunnelling process moves the true header information inside an envelope whose headers only indicate it is coming from a PC to a given ISP, but none of the application data is visible in locations that the DOCSIS

standard expects the data to be. To maintain these capabilities, changes would be required to DOCSIS to allow it to understand the L2TP approach, and where the original header information is located. It also adds overhead to the data transport on the system, which is a concern given the much smaller capacity available in the upstream portion of the HFC network.

8. GTE's proposed forced access solution also requires the installation of special third party software, which would, in turn, require the development and execution of additional processes and procedures, delaying the deployment of, and increasing the costs of deploying cable modem services.

9. Parisian's description of the deployment of cable modem services over a cable network is also incorrect in several additional respects. First, Parisian implies that all devices sit on the same LAN. Parisian Decl. at ¶ 6. This is not true, however, particularly with respect to some of the Layer 3 CMTS devices, such as Motorola, 3com, and Cisco. While these devices share HFC bandwidth, they cannot necessarily talk to each other such as on a typical LAN architecture.

10. Second, Parisian misunderstands the demarcation between Excite@Home network infrastructure and those of its cable affiliates, and overlooks the central role of Excite@Home's network infrastructure in providing cable modem service. Contrary to GTE Attachment Number 3, the "@Home ISP POP", an apparent reference to the Excite@Home Regional Data Center, is not the demaraction point. In fact, a single Regional Data Center may serve multiple cable systems. As an example, the Regional Data Center in Dallas provides service to distant cities such as Oklahoma City, New Orleans and Baton Rouge. The Dallas center is connected to these cities through a regional network also operated by Excite@Home. Many of the regional networks, even some that span only one metro area, serve multiple MSOs. Excite@Home can deliver better

economies of scale and therefore lower costs to consumers by aggregating all these disparate systems into one common unified network.

11. Parisian's understanding of how cable modem service is provided over cable networks also incorrectly assumes that traffic can, or should, be aggregated at the regional data center with little or no effort. Excite@Home is fully integrated such that its equipment is located at almost every head-end, as well as the regional data center. Parisian's proposal would interfere with the caching function, as described below, by moving it from the headend to the regional level. By aggregating the caching function at the regional level, GTE's proposal could force the deployment of more expensive technologies, increase demands on the regional network system, and raise the potential for network congestion. A properly implemented multiple ISP access solution would need to require ISP collocation at each headend since no MSO-owned regional networks exist to provide such aggregation services, or the use of Excite@Home infrastructure to perform the task.

12. In addition, forcing traffic to an aggregation point at a regional data center is inconsistent with existing systems that have been implemented to mitigate and handle broadband traffic. An aggregation model, especially one designed to aggregate heavy traffic flows required by broadband customers of multiple ISPs, would alter the sizing of regional network capacity, increasing the cost of delivering the overall service. Such an aggregation model could potentially strand significant assets that are otherwise operable before they have been fully depreciated.

Access at the Cable Headend Raises Additional Technical Issues

13. Some proposals for forced access would require a cable operator to provide interconnection to an ISP at the cable headend. Such a requirement largely ignores the critical role that modem

provisioning and authentication play in offering cable modem service. Cable modems will not operate without the complex backend systems which provide provisioning and authentication services. For DOCSIS systems, this is provided via DHCP and tftp servers that must accompany all Cable Modem Termination System ("CMTS") devices. Since a CMTS can only be paired with one DHCP server, this is a service that the MSO would need to provide. Excite@Home provides these services today. Retrofitting MSO systems to support data OSS functions would require significant time and resources.

14. To support multiple ISPs at a CMTS, there would need to be a number of changes in the HFC sub-network. This is required to ensure traffic from the Internet to the subscriber returns via the proper ISP's network. First, each ISP would need to have its own address space associated with the CMTS. Since most CMTS equipment are IP routers, each of these separate address blocks would need to be configured into the CMTS equipment. The provisioning systems would need to associate the correct IP address and other IP configuration information for both customer computer and MCNS cable modem into the DHCP server. The DHCP server provides this configuration to customer computers and cable modems at the time the devices boot. The DHCP server is typically shared across a large number of customers, often across many different CMTS devices. Excite@Home currently has about 24 DHCP servers providing coverage for all of its North American markets. Because of the design of DHCP, it is impractical for each ISP in a multiple provider situation to have its own DHCP server.

15. With DOCSIS version 1.0, there is a provision for per-modem rate limiting, but there is no virtual circuit or separate physical circuit between the cable modem and the CMTS equipment. Hence,